Attorney Docket # 410001-374PUS

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Dirk KÖTHEN et al.

Serial No.: 10/559,207

Filed: December 2, 2005

For: Fuel Injection Nozzle

Examiner: McGraw, Trevor E.
Group Art: 3752

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October 3, 2007
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Alfred W. Froebrich
Name of applicant, assignee or Registered Representative

Signature

October 3, 2007
Date of Signature

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APPEAL BRIEF

SIR:

This is an appeal, pursuant to 37 C.F.R. §41.37 from the decision of the Examiner in the above-identified application, as set forth in the Final Office Action wherein the Examiner finally rejected Appellants' claims. The rejected claims are reproduced in the Appendix A attached hereto. A Notice of Appeal was filed on April 12, 2007.

The fee of $510.00 for filing an Appeal Brief pursuant to 37 C.F.R. § 41.20 was previously submitted with the Notice of Appeal filed on April 12, 2007. Appellants requests a 1-month extension of time of the original shortened statutory response period to file this Appeal Brief. A Petition for the 1-month extension of time is enclosed herewith along with the fee of $120. Any additional fees or charges in connection with this application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

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REAL PARTY IN INTEREST

The assignee, MAN B&W Diesel AG, of applicant, Dirk KÖTHEN, Gertrud MEGGENRIEDER, Dietmar PINKERNELL, Andreas STICHNOTH and, Hakan YALCIN, is the real party of interest in the above-identified U.S. Patent Application.

RELATED APPEALS AND INTERFERENCES

There are no other appeals and/or interferences related to the above-identified application at the present time.

STATUS OF CLAIMS

Claims 6 and 9 are pending, have been finally rejected, and are the claims on appeal. Claims 1-5, 7, 8 and 10 have been cancelled. No claims have been allowed.

STATUS OF AMENDMENTS

An Amendment subsequent to the Final Office Action was filed on February 13, 2007. For purposes of Appeal, this amendment has been entered.

SUMMARY OF THE CLAIMED SUBJECT MATTER

Appellant's invention is directed to a fuel injection nozzle comprising a housing (1), where the housing (1) comprises a nozzle needle bore (2) having a central axis, an axial length, and a lower portion comprising a needle seat (3), an axial dimension of the lower

portion is substantially smaller than the axial length of the bore and an outside surface is radially spaced from the axis (see paragraph [0009] of the specification as originally filed).

The housing (1) also includes a cooling duct (6) arranged around the lower portion of the bore, where the cooling duct (6) is closer to the bore than to the outside surface of the housing (1) and has a cross-sectional area in a plane through the central axis. In addition, the cooling duct (6) has a cross-sectional area that has a height in the axial direction and a width transverse to the axis, where the width is approximately 0.25 times the height, and where the entire height of the cooling duct is arranged at the lower portion proximate the needle seat (3) (see paragraph [0010] of the specification as originally filed).

The housing (1) further includes a cooling medium inflow line (7) that has a first portion that extends axially in the housing (1) and a second portion connecting the first portion to the cooling duct (6), where the inflow line (7) has a cross-sectional area and the cross-sectional area of the cooling duct (6) is approximately twice the cross-sectional area of the inflow line (7) (see paragraph [0011] of the specification as originally filed).

GROUNDS OF REJECTION TO BE REVIEWED IN APPEAL

1. Whether independent claim 6 and dependent claim 9 are patentable under 35 U.S.C. §103(a) over DE 27 46 901 ("*Marsch*")?

ARGUMENT

INDEPENDENT CLAIM 6 AND DEPENDENT CLAIM 9 STAND AND FALL TOGETHER

Independent claim 6 recites that the width of the cooling duct is "approximately 0.25 times the height" and further recites that "the cross-sectional area of the cooling duct being approximately twice the cross-sectional area of the inflow line".

The October 13, 2006 Final Office Action takes the position that applicant did not disclose how making the cooling duct with the recited width and height ratio solves any particular problem or is for any purpose. The Final Office Action takes the further position that it appears the invention would perform equally well with the width and height being the same ratio in regard to width and height. The March 7, 2007 Advisory Office Action takes similar positions.

Applicants disagree with the Examiner's position because the specification as originally filed clearly provides a purpose for the particular width/height ratio of the cooling duct. More specifically, paragraph [0010] of the specification as originally filed, states the following:

> "A cooling duct 6 is arranged in the housing. The width of this cooling duct here is approximately 0.25 times the height extending in the direction of the axis A-A.... A cooling duct which is formed in this way may be made to extend ... close to the combustion chamber, thus extending into the end region of the nozzle which is subjected to the highest thermal stress. Furthermore, a large wall surface 8 of the cooling duct 6 which faces the internal region of the nozzle is made available for the transfer of heat to the cooling water."

Clearly applicants have provided a purpose for the particular width to height ratio of the claimed cooling duct. In fact, there is a criticality associated with the specific width of the

duct that is 0.25 times its height, which is more than just a design choice, i.e., for the purpose of (1) extending the cooling duct as close as possible to the combustion chamber and (2) for the purpose of providing a large wall surface on a side of the cooling duct that faces the internal region of the nozzle for the transfer of heat to the cooling water.

Applicants' have now obtained a computer-generated English translation of *Marsch* from the European Patent Office, which translation was not known to be available at the time *Marsch* was cited. Based on a review of the English translation of *Marsch*, neither the text nor the drawings of *Marsch* teach or suggest (1) the claimed width to height ratio of the cooling duct as recited in independent claim 6, or (2) any teaching or suggestion of the purpose of the claimed invention. Accordingly, *Marsch* fails to teach, suggest or provide any reason whatsoever that would cause the skilled person to change the structure taught in *Marsch* so as to establish a width of a cooling duct that is "approximately 0.25 times the height", as expressly recited in independent 6.

Furthermore, *Marsch* fails to teach or suggest "the cross-sectional area of the cooling duct being approximately twice the cross-sectional area of the inflow line". As described in the specification as originally filed, this feature provides a high flow rate of cooling medium and thus a large rate of dissipation. The figures of *Marsch* show only a one-dimensional width of the inflow line and do not disclose the cross-sectional area. There is no mention of a ratio between the cross-section area of the cooling duct and the cross-section area of the inflow line in *Marsch*. Accordingly, *Marsch* fails to teach or suggest "the cross-sectional area of the cooling duct being approximately twice the cross-sectional area of the inflow line", as expressly recited in independent claim 6.

Dependent claim 9, being dependent on independent claim 6, is allowable for at least the same reasons as is independent claim 6, as well as for the additional recitations contained therein.

For the foregoing reasons, it is therefore respectfully submitted that the teachings of *Marsch* fail to establish a *prima facie* case of obviousness with regard to the subject matter recited in claims 6 and 9. The Final Rejection of the claims should be reversed.

CONCLUSION

For the foregoing reasons, it is respectfully submitted that Appellants' claims are not rendered obvious by *Marsch* and are, therefore, patentable over the art of record, and the Examiner's rejections should be reversed.

Respectfully submitted,
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CLAIMS APPENDIX

1. - 5. (Canceled)

6. A fuel injection nozzle comprising a housing, the housing comprising:

a nozzle needle bore having a central axis, an axial length, and a lower portion comprising a needle seat, an axial dimension of the lower portion being substantially smaller than the axial length of the bore;

an outside surface radially spaced from the axis;

a cooling duct arranged around the lower portion of the bore, the cooling duct being closer to the bore than to the outside surface of the housing, the cooling duct having a cross-sectional area in a plane through the central axis, the cross-sectional area having a height in the axial direction and a width transverse to the axis, the width being approximately 0.25 times the height, wherein an entire height of said cooling duct is arranged at said lower portion proximate said needle seat; and

a cooling medium inflow line having a first portion extending axially in the housing and a second portion connecting the first portion to the cooling duct, the inflow line having a cross-sectional area, the cross-sectional area of the cooling duct being approximately twice the cross-sectional area of the inflow line.

7. - 8. (Canceled)

9. The fuel injection nozzle of claim 6 wherein the cooling duct extends axially as far as the needle seat.

10. (Canceled)

EVIDENCE APPENDIX

1. Computer generated translation of DE 2746901 obtained from the European Patent Office.

RELATED PROCEEDINGS APPENDIX

NONE

Result Page

Fuel injecting valve

The invention concerns a fuel injecting valve of a Diesel internal-combustion engine with a housing, into which a separate nozzle body is inserted, in which into the combustion chamber leading nozzle bores as well as a valve seat for a valve needle led in the housing is arranged.

Fuel injecting valves of the kind mentioned are admit (CH HP of 583,376); the use of separate nozzle bodies comes, for example for technical or material reasons particularly with Einspritzventilen cooled by a liquid cooling agent, whereby then the valve seat is in one of a cooling duct for a liquid cooling agent umschlossenen part of the nozzle body. Production this well-known valves requires substantial expenditure, since the housing bore, into which the nozzle body - during the well-known construction one shrinks, from two different sides to be worked on must. The different diameters both sides a paragraph, on which a protruding edge of the nozzle body pushes away, make a continuous treatment more difficult Gehäusebohrung.Die difficulties with the production and treatment arise in the case of the fact in particular from the fact that both drillings with large accuracy must be concentrically to each other.

Task of the invention is it to simplify the production of the described well-known fuel injecting valves. The solution of this task is characterized by the fact that the housing has a only one, paragraphless going through drilling, which takes up the valve needle and the nozzle body, and that the outside lateral surface of the nozzle body is designed as paragraph-free cylinder surface.

With this modification it is reached that the housing bore can be manufactured and worked on continuous from a side, so that the problem of two concentrically lying drillings does not result at all. A further advantage of the new form of the nozzle body exists into it that at its outside lateral surface no sharp corners and edges are present, at which it with the very large load forces of more than 105 N to fatigue cracks to perhaps come can.

In order to achieve a safe anchorage of the nozzle body in the paragraphless drilling, the nozzle body can have for example shrunk, whereby it proved as favourable, if the effective shrinking length, i.e. the length on that those Coat height of the nozzle body in the drilling lies close, at least the 1,5-fache of the nozzle diameter amounts to.

Other appropriate solutions for holding the nozzle body in the drilling result, if the nozzle body is fastened by welding with the help of an electron or a laser beam in the paragraphless drilling, whereby the welding seam < itself to both sides of the cooling duct along; RTI ID=5.1> Mantelfäche< /RTI> extended; additionally the nozzle body can be secured also by a lock washer in the drilling.

The invention is described on the basis remark examples represented in the design.

Fig. 1 shows a first example of a according to invention
Fuel injecting valve in the profile;
Fig. 2 and 3 gives variants of the example after Fig. 1 again.

▲ top

In Fig. 1 represented fuel injecting valve has a housing 1 with a central drilling 2, in which valve < RTI ID=5.2> nadei< /RTI> 3 mobile led is. In the lower part of the housing 1 a nozzle body 4 in the axle of the drilling 2, which projects into the combustion chamber of a not represented Diesel internal-combustion engine, is and nozzle bores 5 as well as a conical valve seat exhibits 6 for the valve needle 3.

The housing 1 contains 3 enclosing fuel area 10, which with a fuel channel 11 is connected into well-known way the valve needle, which is attached to a not represented Brennstoffpumpe over a fuel line. In addition a cooling duct 12 is trained in the housing 1, which is so arranged that the nozzle body 4 within the range of the valve seat 6 is washed around directly by the liquid cooling agent. The cooling agent is supplied to the cooling duct 12 by a cooling borehole 15 in the housing 1 and derived by a similarly trained, not represented drilling again.

The valve needle 3 and the nozzle body 4 taking up drilling 2 are according to invention provided in the housing 1 paragraphless continuous with a only one constant radius, so that, as described, its production and treatment from a side can take place.

The outside lateral surface 13 of the body 4 actual contrary to the initially mentioned execution, with which the nozzle body on a paragraph of the housing bore with a projection/lead rests upon, - according to the paragraphless drilling 2 as smooth and constant circular cylinder surface trained.

The nozzle body 4 shrank in the first example in well-known way into the housing 1. In order a firm seat of the shrunk nozzle body 4 in the housing bore 2 with large forces, which can, the affecting the nozzle body 4, as well known reach N over 105, to ensure is it necessarily to give with given other conditions - like shrinking oversize, shrinking temperature, material combination - the shrinking surface a certain minimum size. As appropriate proved if with given diameter D of the nozzle body < RTI ID=7.1> - < /RTI> and/or. the drilling 2 the effective shrinking length L, which < itself in the

example shown as sum; RTI ID=7.2> Part länge< /RTI> L1 and L2 results in, at least the 1 1/2-1/2-fache of the diameter D is. Under the effective shrinking length L and/or. L1 and L2 are understood thereby the sections of the coat height of the nozzle body 4, along which housings and nozzle bodies actually touch themselves.

As in Fig. 3 shown, the nozzle body 4 additionally by a lock washer 14 can be secured. This ring 14, which is open along its extent in a place, engages thereby on the one hand into an enular groove of the nozzle body 4; on the other hand it supports itself off on the soil of the fuel area 10.

In the example after Fig. the nozzle body 4 in the drilling 2 with a welding seam 15 running on its extent is held 2 and secured. The welding seam 15, which is from outside to inside easily conical trained, is manufactured thereby in specially welding machines by electron or laser beams. As from this example to see it is to be welded not necessarily the nozzle body on its whole height.

In the available case the weld extends approximately over the half coat length of the nozzle body 4.